

Amendments to the Claims

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

- 1 1. (previously presented) A fuel cell power plant (10)
2 for generating electrical energy from a process oxidant
3 stream (53, 42, 28) and a reducing fluid stream (26),
4 the plant comprising:
 - 5 a) at least one fuel cell (12) for producing the
6 electrical energy from the process oxidant stream (53,
7 28) and the reducing fluid stream (26), and providing
8 a fuel cell exhaust stream (48) containing moisture
9 and sensible heat;
 - 10 b) an energy recovery device (32) having first and
11 second gas flow channels (44, 42) separated by a
12 respective enthalpy exchange barrier (46), the fuel
13 cell exhaust stream (48) connected to pass through the
14 first gas flow channel (44) and a source of process
15 oxidant (30) for the process oxidant stream (53)
16 connected to pass through the second gas flow channel
17 (42), thereby to allow mass and heat transfer between
18 the gases in the first and second gas flow channels via
19 the enthalpy exchange barrier;
 - 20 c) a supply of liquid medium (66); and
 - 21 d) means (58, 60) for injecting the liquid medium
22 (66, 64) substantially directly into the process
23 oxidant stream (53) preparatory to the process oxidant
24 passing through the energy recovery device second gas
25 flow channel (42) for regulating the transfer of mass
26 and heat between the fuel cell exhaust stream (48) and
27 the process oxidant stream (53, 42).

1 2. (previously presented) The fuel cell power plant
2 (10) of claim 1 wherein the energy recovery device
3 includes an inlet (54) for receiving the process
4 oxidant stream (53) to pass through the second gas flow
5 channel (42), the liquid medium for injection is water,
6 and the injecting means (58, 60) is positioned to
7 inject the water into the process oxidant stream (53)
8 immediately upstream of said inlet (54).

1 3. (previously presented) The fuel cell power plant
2 (10) of claim 2 including a plenum (62) located
3 immediately upstream of said inlet (54), said process
4 oxidant stream (53) flows through said plenum (62), and
5 wherein the injecting means (58, 60) is operative to
6 inject water (66, 64) into the plenum (62) for intimate
7 mixing with and humidification of the process oxidant
8 stream.

1 4. (currently amended) The fuel cell power plant of
2 claim 2 including a plenum (62) located immediately
3 upstream of said inlet (54) and wherein the injecting
4 means comprises one or more spray nozzles (60) disposed
5 to inject a spray of water (66, 64) into the plenum
6 (62).

1 5. (previously presented) The fuel cell power plant
2 (10) of claim 3 wherein the injecting means comprises
3 one or more spray nozzles (60) disposed to inject a
4 spray of water (66, 64) into the plenum (62).

1 6. (previously presented) The fuel cell power plant
2 (10) of claim 1 including control means (70, 74, 78,
3 80, 84) operatively associated with the injecting means

4 (58, 60) for controlling at least the amount of the
5 liquid medium (66, 64) being injected.

1 7. (original) The fuel cell power plant (10) of claim 6
2 wherein the control means (70, 74, 78, 80, 84) include
3 at least one or the other of a temperature sensor (80)
4 for sensing the temperature of ambient process oxidant
5 and a humidity sensor (84) for sensing the moisture
6 content of the ambient process oxidant.

1 8. (original) The fuel cell power plant (10) of claim 7
2 wherein the control means (70, 74, 78, 80, 84) includes
3 both the temperature sensor (80) and the humidity
4 sensor (84).

1 9. (original) The fuel cell power plant (10) of claim 1
2 wherein the enthalpy exchange barrier (46) of the
3 energy recovery device (32) comprises a fine-pore
4 support matrix.

1 10. (original) The fuel cell power plant (10) of claim
2 9 wherein the fine-pore support matrix is one or a
3 combination selected from the group consisting of
4 porous graphite layers; porous graphite-polymer layers,
5 inorganic-fiber thermoset polymer layers, glass fiber
6 layers, synthetic-fiber filter papers treated to be
7 wettable, porous metal layers, and perforated metal
8 layers with particulate material in the pores.

1 11. (previously presented) In a fuel cell power plant
2 (10) for generating electrical energy from a process
3 oxidant stream (53, 42, 28) and a reducing fluid stream
4 (26), the plant comprising a fuel cell (12) for

5 producing the electrical energy from the process
6 oxidant stream (53, 28) and the reducing fluid stream
7 (26), and providing a fuel cell exhaust stream (48)
8 containing moisture and sensible heat; and an energy
9 recovery device (32) having first and second gas flow
10 channels (44, 42) separated by a respective enthalpy
11 exchange barrier (46), the fuel cell exhaust stream
12 (48) connected to pass through the first gas flow
13 channel (44) and a source of process oxidant (30) for
14 the process oxidant stream (53) connected to pass
15 through the second gas flow channel (42), thereby to
16 allow mass and heat transfer between the gases in the
17 first and second gas flow channels via the enthalpy
18 exchange barrier, the method comprising:
19 dispensing water (66, 70, 74, 60, 64) substantially
20 directly into the process oxidant stream (53)
21 preparatory to the process oxidant passing through the
22 energy recovery device second gas flow channel (42) for
23 regulating the transfer of mass and heat between the
24 fuel cell exhaust stream (48) and the process oxidant
25 stream (53, 42).

1 12. (original) The method of claim 11 wherein the step
2 of dispensing water (66, 70, 74, 60, 64) into the
3 process oxidant stream (53) comprises monitoring (80,
4 84, 90) one or more parameters of the fuel cell power
5 plant (10), including the process oxidant stream (53,
6 42, 28), and controllably injecting water into the
7 process oxidant stream (53) in response to the one or
8 more of the monitored parameters.

1 13. (original) The method of claim 12 comprising the
2 steps of monitoring (80) the temperature of the process
3 oxidant stream (53), and injecting water (66, 70, 74,

4 60, 64) into the process oxidant stream when the
5 temperature exceeds a threshold, thereby to cool and
6 humidify the process oxidant stream (53, 42) to inhibit
7 dry-out of the enthalpy exchange barrier 46 in the
8 energy recovery device 32.

1 14. (previously presented) The method of claim 13
2 wherein the temperature threshold is higher than about
3 85° F and lower than about 90° F.

1 15. (previously presented) The method of claim 12
2 wherein the operating status of the power plant (10) is
3 monitored (70, 80) to identify a start-up condition,
4 and injecting water (66, 70, 74, 60, 64) into the
5 process oxidant stream upon start-up, at least after a
6 shutdown exceeding a predetermined duration, for
7 assuring sufficient wetting of the enthalpy exchange
8 barrier (46) during start-up.

1 16. (original) The method of claim 15 wherein a
2 temperature of the power plant (10), including the
3 inlet temperature of the process oxidant stream (53,
4 42, 28), is monitored (80) to detect a freezing
5 condition, and controllably (70, 78) injecting heated
6 water (66, 58, 60, 64) during start-up in response to
7 detection of a freezing condition to defrost at least
8 the energy recovery device 32.

1 17. (previously presented) The method of claim 12
2 wherein the fuel cell power plant (10) includes a
3 coolant system (38, 88) having a coolant, the coolant
4 having a level, and including the steps of monitoring
5 (90) the level of coolant in the coolant system (38,
6 88) and injecting water (66, 58, 70, 74, 78, 60, 64)

7 into the process oxidant stream when the coolant level
8 exceeds a threshold, thereby to raise the dew point of
9 the process oxidant stream (53, 42) to inhibit recovery
10 of water from the fuel cell exhaust stream 48 via the
11 enthalpy exchange barrier 46 to the process oxidant
12 stream (42).